भारतीय मानक **IS 5776 : 2023**

Indian Standard

एलपीजी के साथ प्रयुक्त बल्क वॉटर हीटर — विशिष्टि

(दूसरा पुनरीक्षण)

Bulk Water Heater for use with LPG — Specification

(Second Revision)

ICS 27.060.10

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April 2023 **Price Group 5**

Domestic and Commercial Gas Burning Appliances (Pressure Type) Sectional Committee, MED 23

FOREWORD

This Indian Standard (Second Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Domestic and Commercial Gas Burning Appliances (Pressure Type) Sectional Committee had been approved by the Mechanical Engineering Division Council

This standard was first issued in 1970 and subsequently revised in 1988. This standard is being revised again to keep pace with the latest technological developments and international practices. Also, in this revision, the standard has been brought into latest style and format of Indian Standards, and references to Indian Standards, wherever applicable have been updated. BIS certification marking clause has been modified to align with the revised *Bureau of Indian Standards Act,* 2016.

This standard is one of a series of Indian Standards on various domestic and commercial gas burning appliances (pressure type) used with liquefied petroleum gases. General requirements of these equipment are covered in IS 5116 : 2020 which is a necessary adjunct to this standard. Should, however, any deviation exists between the requirements given in IS 5116 : 2020 and those of this standard, provisions of the latter shall apply.

The composition of the committee responsible for the formulation of this standard is listed in Annex C.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test, shall be rounded off in accordance with IS 2 : 2022 ‘Rules for rounding off numerical values (*second revision*)’. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

BULK WATER HEATER FOR USE WITH LPG — SPECIFICATION

(Second Revision)

1 SCOPE

1.1 This standard covers the requirements for tea water heaters, coffee urns and milk heaters which are intended for intermittent or bulk heating rather than continuous delivery of hot or boiling water for use with LPG at 2.942 kN/m^2 (30 gf/cm^2) gas inlet pressure.

1.2 This standard does not cover requirements for automatic boiling water appliances.

2 REFERENCES

The standards listed below contain provisions which, through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards listed below. In case the standards are to be referred in this clause they are to be listed as follows:

IS No.	*Title*
IS 5116 : 2020	Domestic and commercial equipment for use with LPG — General requirements (*fourth revision*)
IS 6480 : 1988	Glossary of terms relating to domestic and commercial gas-burning appliances (*first revision*)

3 TERMINOLOGY

For the purpose of this standard, relevant definitions given in IS 6480 shall apply.

4 MATERIAL

The material shall conform to the relevant requirements specified in Section 1 of IS 5116.

5 CONSTRUCTIONAL REQUIREMENTS

In addition to the relevant requirements given in Section 1 of IS 5116, the requirements specified in **5.1** to **5.8** shall apply.

5.1 Capacity

The normal capacity shall be determined by the amount of water capable of being drawn from the draw-off tap when filled to the level of the overflow. Where no overflow is fitted, the boiler shall be filled to the brim and 1 litre removed for each 20 litre or fraction thereof. This figure shall be used by the manufacturer in all statements of capacity.

5.2 Features

The following features shall be provided for tea water boilers of 45 litre capacity and upwards:

a) A thermometer or other indicator of boiling point;
b) A gauge glass calibrated in litres or its equivalent (for pressure boilers, the gauge shall be marked with maximum levels);
c) An overflow connection to prevent initial overfilling or boiling over; and
d) A draw-off tap extending at least 200 mm.

5.3 Taps

Draw-off taps shall be of smooth bore and capable of being easily cleaned. Tea water boilers having a capacity greater than 65 litre shall have a tap giving a rate of discharge not less than 12 litre a minute. Taps on all other appliances shall be capable of draining the water capacity of the appliance within 5 minutes.

5.4 Joints and Surfaces

All parts of bulk water heaters subjected to direct heat shall have brazed or welded joints. Interior surfaces shall be of such materials or so protected as to avoid contamination of the contents.

5.5 Pilot

Appliances provided with a pilot and not fitted with a pilot safety device shall be fitted with safety pattern pilot taps which prevent the main gas taps from turning to the ‘ON’ position until the pilot tap is turned on and, where necessary, the pilot swung into the lighting position.

5.6 Flames

It is essential that the pilot flame shall be visible either directly or by reflection. The burner flames shall cross-light at the full ‘ON’ gas rate. The lowest working rate for the stability check on appliances without thermostatic control shall be such as to provide the heat input necessary to maintain the water in the heater at boiling point.

5.7 Milk and Coffee Urns

The inner linings and fittings shall be constructed of suitable materials which will not affect the taste of the beverages, for example, stainless steel, porcelain or glass, and should be easily removable for cleaning. The construction shall prevent the accidental entry of milk or coffee into the surrounding heating or insulating jacket and vice-versa.

5.8 Coffee and Tea Infusers

The infuser shall not affect the taste or colour of the beverage; it shall be capable of easy cleaning and shall have a securely fixed handle of robust construction to facilitate removal. Tea infusers shall be large enough to allow the leaves to expand freely.

6 PERFORMANCE REQUIREMENTS

6.1 In addition to the relevant requirements given in Section 2 of IS 5116, the requirements given in **6.2** to **6.5** shall apply.

6.2 Combustion

6.2.1 When tested as covered in **6.2.2**, the carbon monoxide/carbon dioxide ratio of exhaust gases of the appliance operating at any combustion at which the flame is stable at gas inlet pressure from 2.452 kN/m^2 to 3.432 kN/m^2 (25 gf/cm^2 to 35 gf/cm^2) shall not exceed 0.02. The carbon monoxide/carbon dioxide contents of the products of combustion shall be determined by the methods capable of giving accuracy of 0.001 percent and 0.05 percent respectively of the volume of the sample.

NOTE — This test need not be performed on burners with a gas rate of less than 20 l/h at 2.942 kN/m^2 (30 gf/cm^2) gas inlet pressure.

6.2.2 Water heater shall be filled to the normal capacity. With the thermostats, if any, at the maximum setting, the burner shall be lit and a sample of the flue gases taken at the flue spigots or at the outlet end of the primary flue, if fitted, after 15 minutes of lighting.

6.3 Thermal Efficiency

When tested as prescribed in Annex A, the thermal efficiency of the water heaters shall be not less than 50 percent.

6.4 Heating

When tested as prescribed in Annex B, the time required to heat the water in the boiler from 20 to 95 °C, when filled to normal capacity, shall not exceed the following:

Appliance Capacity litres	*Time* minutes
Up to 90	55

91 to 135	65
136 to 180	75

6.5 Fire Hazard and Limiting Temperatures

The appliances shall conform to the requirements described in **23** of IS 5116 with the gas turned on to full and, when water boils, the gas shall be turned down to a rate just sufficient to maintain boiling.

7 INSTRUCTIONS

The appliance shall be accompanied by an instruction sheet with the relevant instructions given in **24** of IS 5116.

8 MARKING

8.1 Each appliance shall be legibly and indelibly marked with the following:

a) Manufacturer’s name, initials or registered trade-mark;
b) Total gas consumption (commercial butane in g/h);
c) Rating of burners in kcal/h (with commercial butane);
d) Any special instructions for the safe use of the appliance;
e) Country of origin;
f) The words ‘for use with liquefied petroleum gases’ at 2.942 kN/m^2 (30 gf/cm^2); and
g) Temperature chart corresponding to the thermostat setting, if the thermostat is provided.

The information given in **8.1** shall be distinct, permanent and easily accessible when the appliance is installed as it would be in service.

8.2 BIS Certification Marking

The water heater may also be marked with the Standard Mark.

8.2.1 The product(s) conforming to the requirements of this standard may be certified as per the conformity assessment schemes under the provisions of the *Bureau of Indian Standards Act*, 2016 and the Rules and Regulations framed thereunder, and the products may be marked with the Standard Mark.

9 PACKING

9.1 The method for packing shall be such as to minimize the damage to the appliance in transit, if governors or relay controls are unavoidably supplied loose, moving parts shall be clamped with the valve in the open position, and the inlet and the outlet shall be plugged.

9.2 All open pipe ends and connection openings shall be suitably plugged, and sealed to prevent the entry of extraneous matter.

ANNEX A

(*Clause* 6.3)

THERMAL EFFICIENCY TEST

A-1 OBJECT

To determine the portion of the heat input to the burner that is recovered in the water when a known mass of water is heated through an observed temperature range.

A-2 PROCEDURE

For the purpose of the test, the lid supplied by the manufacturer, if easily removable, may be replaced by a plate of 1.25 mm galvanized mild steel. This plate is drilled centrally to take a thermometer and arranged to accommodate a stirring device. If the lid is hinged or fixed, appropriate arrangements shall be made for determining the average temperature of the water. Fill the appliance with water equivalent to specified capacity at 23 °C ± 2 °C. To commence the test, record the initial water temperature, light the burner and simultaneously start the stop-watch. Observe the thermometer periodically and commence stirring when the temperature has reached 90 °C. When the temperature has reached 95 °C, turn the gas off and stop the the watch. Continue stirring until the maximum temperature is reached on the thermometer and calculate the thermal efficiency as follows:

$$\text{Thermal efficiency} = \frac{W \times (t_2 - t_1) \times 100}{C \times G}$$

where

W = Quantity of water in kg equivalent to appliance capacity,
t_2 = Final temperature of water in °C,
t_1 = Initial temperature of water in °C,
C = Calorific value of gas in kcal/g, and
G = Corrected mass of gas consumed in g.

ANNEX B

(*Clause* 6.4)

HEATING TEST

B-1 OBJECT

To determine the time required to heat the water in the boiler from 20 °C to 95 °C, when filled to normal capacity, using test gas.

B-2 PROCEDURE

The heating time shall be calculated from the results obtained in the thermal efficiency test as follows:

$$\text{Heating time} = \frac{472\ 340\ W}{\text{Thermal efficiency} \times H}$$

where

W = Quantity of water in kg equivalent to appliance capacity, and
H = approved heat input in kcal.

ANNEX C
(*Foreword*)

COMMITTEE COMPOSITION

Domestic and Commercial Gas Burning Appliances Sectional Committee, MED 23

Organization	*Representative(s)*
L.P.G. Equipment Research Centre, Bengaluru	Shri Ashish Bera (***Chairperson***)
Agnisumukh, Bengaluru	Shri Hari Rao
Ariston Thermo India Private Limited, Pune	Shri Abhijit Banshelkikar Shri Mahesh Bhangale (*Alternate*)
Bharat Petroleum Corporation Limited, Mumbai	Shri Hari Babu Banoth Shri Mohit Rane (*Alternate*)
BSH Household Appliances Manufacturing Private Limited, Chennai	Shri Vijay Kumar Loganathan
Bureau of Energy Efficiency, New Delhi	Ms Pravatanalini Samal Shri Kamran Shaikh (*Alternate*)
Delton Industries, New Delhi	Shri R. C. Nangia Shri Vivek Nangia (*Alternate*)
Directorate General of Quality Assurance (Stores), Kanpur	Shri H. H. P. Tiwari
Gorani Industries Limited, Indore	Shri Anil Gorani
Goyal Engineers Private Limited, New Delhi	Shri Ajay Goyal Shri Neeraj Goyal (*Alternate*)
Hindustan Petroleum Corporation Limited, Mumbai	Shri Rakesh G. Khade Shri Subramani Siva shankar (*Alternate*)
Indian Institute of Petroleum, Dehradun	Shri Pankaj Kumar Arya
Indian Institute of Technology Guwahati, Guwahati	Shri Muthu Kumar
Indian Oil Corporation (Marketing), Mumbai	Shri J. Shyam Swaroop
Indraprastha Gas Limited, New Delhi	Shri Pawan Kumar Shri Anupe Francis (*Alternate*)
L.P.G. Equipment Research Centre, Bengaluru	Shri P. R. Deodhar
Petroleum Conservation Research Association, New Delhi	Shri Surendra Pratap
Rama Domestic Appliances, New Delhi	Shri Amarjeet Singh Kohli Shri Manmohan Krishnan (*Alternate*)
Shri Krishna Test House, New Delhi	Shri Sunil Talwar
Sunflame Enterprises Private Limited, Faridabad	Shri K. L. Verma Shri Sandeep Juneja (*Alternate*)

Organization	*Representative(s)*
Superflame Enterprises Private Limited, Faridabad	Shri Vikram Verma
Vanaz Engineers Limited, Pune	Shri A. A. Tamboli Shri V. N. Pujari (*Alternate*)
In Personal Capacity (*S-139, Greater Kailash-I, 1st and 2nd Floor, New Delhi – 110048*)	Shri M. K. Gupta
BIS Directorate General	Shri Rajneesh Khosla, Scientist 'F'/Senior Director and Head (Mechanical Engineering) [Representing Director General (*Ex-officio*)]

Member Secretary
Shri Sandeep Keshav
Scientist 'C'/Deputy Director
(Mechanical Engineering), BIS

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